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PRELIMINARY REPORT

Physical and Biological Environment, Wildlife, Vegetation, Water quality and Aquatic Ecology of Status Baseline Conditions

Submitted by

The Montana Energy and MHD Research
and Development Institute, Inc.
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to the

Old West Regional Commission

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15 April 1978

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I. INTRODUCTION

Ecological Consulting Service (ECON) of Helena began baseline environmental studies on a limited basis in the vicinity of Glasgow Air Force Base in April 1977. By August 1977, as contract developments were progressing with the Montana Energy and MHD Research Institute (MERDI), the studies were increased to their present levels. The methods and scope of the studies which ECON is conducting for the environmental baseline report and environmental impact statement for the transfer of ownership of the Glasgow Air Force Base and possible further development of the site are outlined in the contract between ECON and MERDI. The three areas of study which ECON is concerned with are water quality, wildlife, and vegetation. This report deals with the progress on these studies by ECON as of March 31, 1978.

II. AQUATIC STUDIES

Stations 1-6, the locations of which are shown in Figure 1, have been sampled continuously according to the schedule shown in Table I.

TABLE I

SCHEDULE OF SAMPLE COLLECTIONS FROM AQUATIC SAMPLING STATIONS, MAY 12, 1977 - MARCH 8, 1978

Station	May 12	June 8	July 29	Sept. 4	Oct. 16	Dec. 11	Mar. 8
1	X	X	X	X	X	X	X
2			X	X	X	X	X
3	X	X	X	X	X	X	X
4	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X
6				X	X	X	X

Dates are approximate within 48 hours. Stations sampled initially but on which sampling was discontinued include:

1A: An artificial pond formed in a gravel pit on the east side of Highway 247 about one kilometer north of Glasgow Air Force Base (GAFB).

3A: Located on Porcupine Creek just below the confluence of the east and main forks, about midway between Stations 3 and 4.

A summary of selected chemical and physical data collected during the period from May 1977 to March 1978 is presented in Tables II through V.

Biological samples have been collected throughout the sampling period including benthic invertebrates, plankton, algae, and periphyton for chlorophyll-biomass analysis. Results of periphyton analysis on samples collected from artificial substrates in place during the period from September 4 to October 16, 1977 are presented in Table VI. Approximately 100 invertebrate samples have

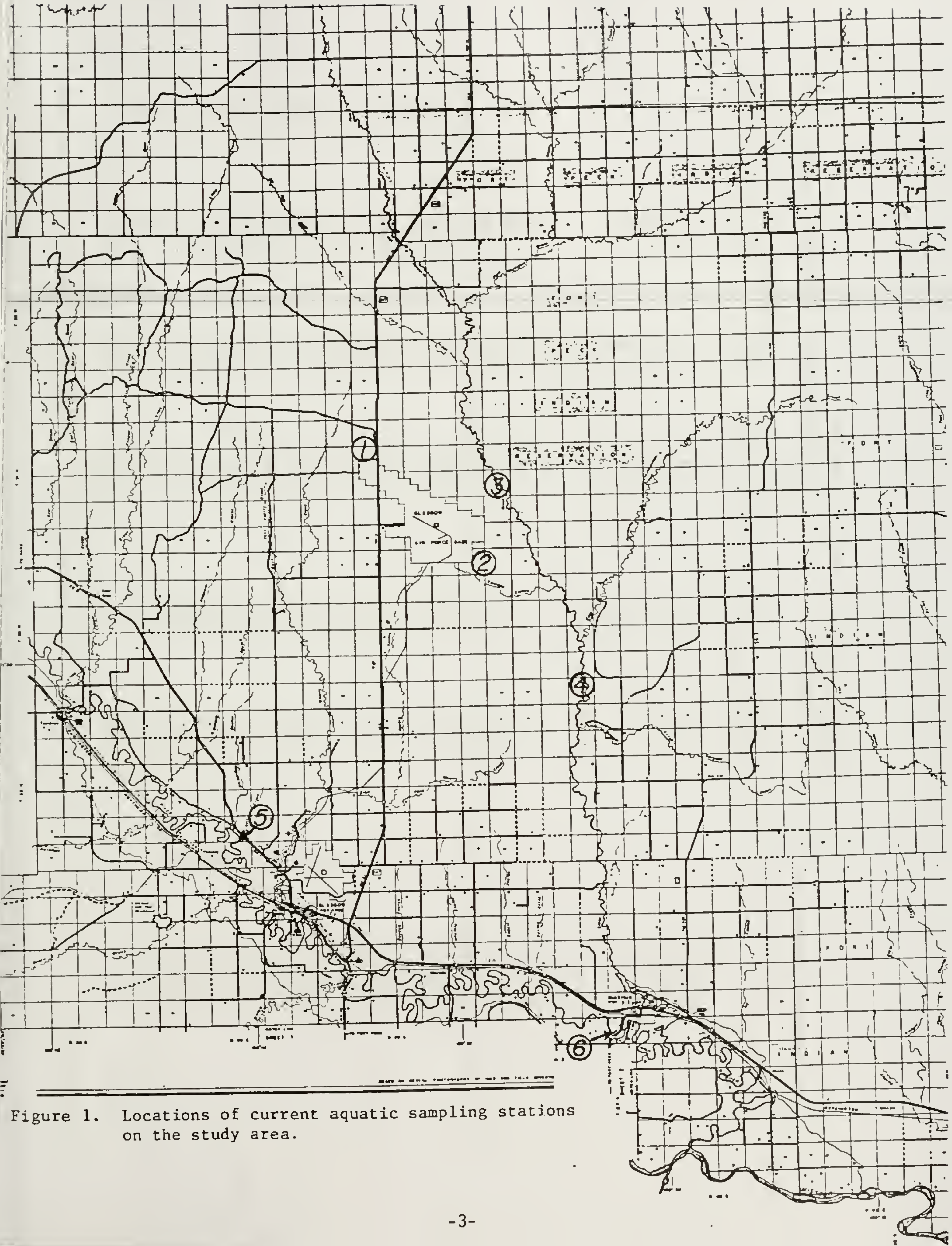

Figure 1. Locations of current aquatic sampling stations on the study area.

TABLE II

FIELD CHEMICAL AND PHYSICAL ANALYSES

Station	Date	Temperature o C.	D.O. mg·L^{-1}	pH	Total Alkalinity mg·L^{-1} CaCO$_3$	Alkalinity mg·L^{-1} CaCO$_3$		
						CO$_3$	HCO$_3^-$	Non-CO$_3$
1	5/12/77	21	9.9	6.8	298	0	298	0
	6/08/77	22	9.1	8.9	293	26	266	0
	7/28/77	22	8.5	9.4	267	42	225	0
	9/04/77	18	12.4	9.5	264	85	179	0
	10/15/77	8	7.9	8.2	274	3	271	0
	12/11/77	1	7.4	8.3	325	4	321	0
	3/08/78	1	6.8	7.9	398	1	397	0
2	5/12/77	--	--	--	--	--	--	--
	6/08/77	--	--	--	--	--	--	--
	7/28/77	22	5.3	9.3	209	27	182	0
	9/04/77	15	9.4	9.8	258	58	200	0
	10/15/77	9	11.6	9.8	178	49	129	0
	12/11/77	1	8.4	9.8	221	51	170	0
	3/08/78	1	0.2	7.7	625	1	624	0
3	5/12/77	21	8.4	7.4	315	0	315	0
	6/08/77	20	7.3	8.4	330	10	320	0
	7/28/77	22	10.7	8.4	330	55	275	0
	9/04/77	21	15.8	8.5	310	6	304	0
	10/15/77	12	13.8	8.2	341	4	337	0
	12/11/77	2	5.4	7.8	345	0	345	0
	3/08/78	1	2.7	7.5	346	1	345	0
4	5/12/77	25	10.1	7.1	295	0	295	0
	6/08/77	25	9.7	8.8	253	16	236	0
	7/28/77	25	8.9	8.1	353	0	353	0
	9/04/77	16	8.2	8.0	349	0	349	0
	10/15/77	9	11.6	8.2	349	3	346	0
	12/11/77	2	0.7	7.7	369	0	369	0
	3/08/78	1	0.2	7.3	425	0	425	0

(Continued)

Table II (Continued)

Station	Date	Temperature ° C.	D.O. mg·L^{-1}	pH	Total Alkalinity mg·L^{-1} CaCO$_3$	Alkalinity mg.L^{-1} CaCO$_3$		
						CO$_3$	HCO$_3$	Non-CO$_3$
5	5/12/77	25	7.2	7.3	382	0	382	0
	6/08/77	22	9.8	8.5	294	10	284	0
	7/28/77	23	9.1	8.3	355	0	355	0
	9/04/77	19	8.7	8.2	290	0	290	0
	10/15/77	10	9.3	8.1	315	3	312	0
	12/11/77	2	9.4	8.2	400	4	396	0
	3/08/78	1	10.3	7.8	396	1	395	0
6	5/12/77	--	--	--	--	--	--	--
	6/08/77	--	--	--	--	--	--	--
	7/28/77	--	--	--	--	--	--	0
	9/04/77	20	10.4	8.6	326	10	306	0
	10/15/77	11	9.2	8.4	338	6	332	0
	12/11/77	2	8.4	8.2	414	5	409	0
	3/08/78	1	7.4	7.7	388	1	387	0

TABLE III

LABORATORY CHEMICAL ANALYSES

Station	Date	mg·L^{-1}				
		Ca^{2+}	Mg^{2+}	Na^+	K^+	Hardness as $CaCO_3$
1	5/12/77	42	30	--	--	230
	6/08/77	60	35	--	5.0	209
	7/28/77	29	30	148	5.0	170
	9/04/77	24	28	162	5.0	174
	10/15/77	29	20	97	3.8	154
	12/11/77	40	38	150	8.0	257
	3/08/78	61	40	172	14.9	235
2	5/12/77	--	--	--	--	--
	6/08/77	--	--	--	--	--
	7/28/77	85	86	250	16.0	594
	9/04/77	76	114	265	17.5	660
	10/15/77	61	100	248	18.4	564
	12/11/77	107	130	338	21.6	803
	3/08/78	228	189	800	25.6	962
3	5/12/77	51	28	--	--	241
	6/08/77	45	26	165	5.0	232
	7/28/77	56	31	162	5.0	236
	9/04/77	50	30	168	5.0	246
	10/15/77	37	26	117	6.2	199
	12/11/77	57	26	141	7.1	251
	3/08/78	82	36	149	14.4	280
4	5/12/77	49	44	--	--	277
	6/08/77	72	28	605	21.6	258
	7/28/77	85	34	236	5.8	294
	9/04/77	69	40	316	7.5	335
	10/15/77	62	23	167	6.2	247
	12/11/77	63	26	236	7.1	264
	3/08/78	94	34	367	14.4	306

(Continued)

Table [illegible]I (Continued)

Station	Date	mg·L-1				
		Ca^{2+}	Mg^{2+}	Na^+	K^+	Hardness as $CaCO_3$
5	5/12/77	103	54	--	--	446
	6/08/77	80	40	230	9,6	342
	7/28/77	80	46	263	9,6	382
	9/04/77	80	41	220	9,0	369
	10/15/77	86	41	294	10.0	384
	12/11/77	104	58	321	10,0	498
	3/08/78	111	58	312	15.1	398
6	5/12/77	--	--	--	--	--
	6/08/77	--	--	--	--	--
	7/28/77	--	--	--	--	--
	9/04/77	87	52	275	11.0	432
	10/15/77	79	41	231	10,0	384
	12/11/77	99	58	340	10.0	498
	3/08/78	104	58	312	15.1	398

TABLE IV

LABORATORY CHEMICAL ANALYSES

Station	Date	$mg \cdot L^{-1}$							
		B^-	Cl^-	F^-	Dissolved Si as SiO_2	SO_4^{-2}	Dissolved Inorg-P as P	Dissolved Inorg-NH_3 as N	$NO_2 + NO_3$ as N
1	5/12/77		14.0	.00	--	148	.020	.380	.050
	6/08/77		13.8	.48	--	156	.040	.300	.040
	7/28/77		12.0	.36	--	210	.065	--	<.010
	9/04/77		10.5	.35	10.60	130	.123	.444	<.010
	10/15/77		17.8	.36	7.90	150	.036	.185	.176
	12/11/77		19.0	.36	6.90	132	.102	.053	<.005
	3/08/78		20.0	.47	13.50	207	.104	.060	.185
2	5/12/77		--	--	--	--	--	--	--
	6/08/77		--	--	--	--	--	--	--
	7/28/77		18.5	.35	--	890	<.010	--	<.010
	9/04/77		19.0	.31	4.05	990	.054	.111	<.010
	10/15/77		28.8	.34	2.93	865	.029	.113	.006
	12/11/77		36.8	.38	4.20	--	.013	.032	<.005
	3/08/78		35.0	.73	31.96	938	.940	1.000	≈.005
3	5/12/77		11.5	.34	--	204	≈.010	.075	.020
	6/08/77		11.5	.66	--	197	.300	.160	.060
	7/28/77		10.5	.46	--	270	.025	--	<.010
	9/04/77		8.9	.45	3.15	180	.011	.292	<.010
	10/15/77		17.3	.40	5.77	128	.006	.135	<.005
	12/11/77		13.0	.33	10.60	140	.020	.012	.013
	3/08/78		14.5	.38	11.70	228	.029	.051	≈.005
4	5/12/77		13.8	.21	--	358	.080	.080	.040
	6/08/77		17.0	.87	--	502	.600	.150	.060
	7/28/77		17.5	.59	--	315	.011	--	<.010
	9/04/77		18.0	.49	10.20	550	.008	.216	<.010
	10/15/77		15.1	.59	7.10	334	.004	.004	<.005
	12/11/77		16.0	.58	12.10	382	≈.005	.035	.031
	3/08/78		20.1	.63	15.10	626	.228	.378	.049

(Continued)

Table IV (Continued)

Station	Date	mg·L^{-1}							
		B^-	Cl^-	F^-	Dissolved Si as SiO_2	SO_4^{-2}	Dissolved Inorg-P as P	Dissolved Inorg-NH_3 as N	$NO_2 + NO_3$ as N
5	5/12/77		20.0	.21	--	--	<.010	.875	.030
	6/08/77		34.5	.68	--	514	.300	.390	.040
	7/28/77		31.5	.40	--	365	.042	--	<.010
	9/04/77		29.0	.38	8.70	374	.008	.151	<.010
	10/15/77		28.7	.43	6.46	566	.003	≃.005	<.005
	12/11/77		47.0	.41	8.30	660	≃.005	.108	.105
	3/08/78		41.3	.49	11.70	525	.010	.068	.148
6	5/12/77		--	--	--	--	--	--	--
	6/08/77		--	--	--	--	--	--	--
	7/28/77		--	.40	--	--	--	--	--
	9/04/77		43.3	.40	9.65	514	.015	.054	<.010
	10/15/77		39.3	.41	6.60	470	.010	≃.004	<.005
	12/11/77		59.0	.43	9.60	660	.014	.275	.170
	3/08/78		46.1	.43	11.36	588	.054	.150	.193

TABLE V

LABORATORY CHEMICAL ANALYSES: METAL CATIONS[1] - DATE OF SAMPLE COLLECTION: SEPTEMBER 4, 1977

	$mg \cdot L^{-1}$							
Station	Al	Cr	Cu	[2]Cd	Fe	Mn	[3]Pb	Zn
1			.010	BLD	225	.058	BLD	.010
2			.010	BLD	156	.074	BLD	.024
3			<.010	BLD	142	.028	BLD	.220
4			.010	BLD	500	.145	BLD	.025
5			.028	BLD	1,775	.300	BLD	.156
6			<.010	BLD	2,260	.413	BLD	.022

[1] Extracted in HCL and HNO_3.
[2] Below Limit of Detection (≃ .100 $\mu g \cdot L^{-1}$).
[3] Below Limit of Detection (≃ .010 $\mu g \cdot L^{-1}$).

TABLE VI

PERIPHYTON BIOMASS-CHLOROPHYLL RELATIONSHIPS DETERMINED USING GLASS SLIDES AS SUBSTRATE

Date	Station	No. of Samples	Average Chla ($mg \cdot m^{-2}$)	Average Chla ($mg \cdot m^{-2}/day$)	Average Ash-free Dry Wt. ($mg \cdot m^{-2}$)	Average Autotrophic Index	Average Chla/Pha
9/04/77 - 10/16/77	3	2	1.800	.0399	1,370	761	0.930
	4	2	3.348	.0816	1,918	573	0.845
	5	2	4.071	.0925	1,728	424	0.740
	6	2	10.198	.2487	3,704	363	1.000
10/16/77 - 12/11/77	*3						
	4	2	0.654				
	*5						
	*6						

*Artificial substrates lost. Autotrophic index will be calculated using samples collected from native substrates.

been collected. Of these, 40 have been separated and individuals classified to taxa. Complete data and analysis will be presented in a final report.

Dominant cations in waters sampled are Na, Mg, and Ca. The dominant anions are SO_4^{-2} and HCO_3^-.

Station 1 is a spring-fed artificial pond in which surface dissolved oxygen concentrations remain high throughout the year. Maximum observed temperature was 22° C. in July. Plant production appears to be high, based on observations of oxygen supersaturation, dense plankton algae populations, and well-developed littoral flora. Concentrations of N and P varied widely, but indicate the pond is naturally eutrophic. Dominant invertebrates (in number) are Amphipoda, Mollusca (snails), and Chironomidae (Diptera). A diverse and well-developed benthic fauna is present, especially in the littoral community.

Station 2 is a small pond fed by surface and ground water. The levee leaks, thus the pond is subject to severe winter drawdown, leaving about 90% of its area exposed to snow and ice. The water is $NA\text{-}MG\text{-}SO_4\text{-}HCO_3$ in nature. The maximum depth is about 10 feet. Plant productivity is high, but algal blooms, such as were seen at Station 1, were not observed. P and N concentrations are lower than at Station 1 throughout the summer. The littoral vegetation is well developed, mostly *Myriophyllum exalbescens* and *Potamogeton pectinatus.* Dissolved oxygen remains high in summer but drops to nearly zero in winter, due partly to the drawdown, which increases the bottom area:water volume ratio. Major benthic invertebrate taxa are Amphipoda, Mollusca (snails), and Chironomidae.

Stations 3 and 4 are located in pools on Porcupine Creek. Water chemistry is similar to that of the Milk River, concentrations of most constituents being slightly higher at the lower station, apparently due to the influence of the

East Fork. The creek flows intermittently during the spring and summer months, but is apparently subject to spring flooding from runoff. Dissolved oxygen is high in the summer months, and the observed supersaturation at Station 3 in September indicates a high level of plant production. These pools apparently do not freeze solid in winter but are subject to severe dissolved oxygen deficits, especially at the downstream station due to the presence of a cattle-feeding area immediately adjacent. This also results in winter increases of P and NH_3-N. The benthic fauna is dominated by Amphipoda and Ephemeroptera. The insect fauna at both stations is diverse.

Chemistry at Stations 5 and 6 is very similar with slight increases in some constituents at the downstream site (NA^+, CL^-, P, and NH_3-N), due probably to the influence of Glasgow and Nashua and agricultural runoff. Dissolved oxygen is high at both stations. Periphyton growth on glass slides from September until October was highest of all stations at Station 6, indicating a downstream increase in the Milk River waters ability to support plant growth. Benthic fauna is dominated by Diptera (Simuliidae) and Trichoptera (*Cheumatopsyche*), and faunal diversity is lowest in Stations 5 and 6 of all stations sampled, both pool and riffle habitats.

III. WILDLIFE STUDIES

A. Major Wildlife Species

Observations of the major wildlife species (game species, raptors, and predators) for determination of distribution and habitat use were essentially limited to aerial observations during the winter period. The vehicle routes were run regularly during October and November, but since then, conditions have not permitted their continuation. Some incidental observations were made from the few open roads during the winter period. The aerial observation route coverages of the 600-square-mile study area were conducted on the following dates: November 17 and 28, December 12 and 13, January 6 and 8, February 14 and 15, and March 8, 9, and 10. Additional flights over portions of the study area were conducted on other dates for supplemental observations.

Antelope accounted for most of the major species observations during the fall and winter periods, particularly the latter. A total of 5,841 antelope were observed between October 1 and March 15 (Table VII). Most of the antelope observed were migratory animals which moved into or through the study area from the north (primarily from Canada). This was in response to the severe weather conditions this past winter and has also occurred previously during other severe winters. The greatest numbers of antelope on the study area apparently occurred during December when the migratory animals began moving through the area. The greatest winter concentrations of antelope on the study area occurred along Cherry Creek and the Lime-Canyon Creek drainage. A group of 50-60 antelope also wintered just north of the air force base. A feeding site examination at an antelope concentration area along Cherry Creek on February 27, 1978

MAJOR SPECIES WILDLIFE OBSERVATIONS ON THE GLASGOW AIR FORCE BASE STUDY AREA, OCTOBER 1, 1977 - MARCH 15, 1978

Species	Month	Males	Females	Young	Unknown	Total No.	Habitat Types[1] and Number Observed in Each Type
ANTELOPE:	October	1	5		1	7	111-1, 212-5, 533-1
	November			4	193	197	212-164, 231-11, 533-22
	December	37			1328	1365	111-10, 212-1088, 220-13, 231-25, 533-229
	January	2	3		3073	3078	111-2095, 212-160, 220-695, 231-80, 533-48
	February				816	816	111-588, 212-155, 220-41, 231-25, 533-7
	March	4	16		358	378	111-329, 212-15, 231-6, 533-28
Totals........................		44	24	4	5769	5841	
MULE DEER:	October					0	
	November	5	23	27		55	212-27, 220-28
	December	4			129	133	111-9, 212-52, 220-26, 231-46
	January	8	3	5	281	297	111-130, 212-42, 220-63, 231-62
	February				227	227	111-209, 220-18
	March				92	92	111-53, 220-28, 231-11
Totals........................		17	26	32	729	804	
WHITE-TAILED DEER:	October	1	3	1	6	11	220-11
	November	9	12	9		30	220-29, 212-1
	December	1	2		8	11	212-2, 220-8, 533-1
	January	3	6	2	63	74	111-41, 220-33
	February				82	82	111-28, 220-54
	March				20	20	111-7, 220-13
Totals........................		14	23	12	179	228	
WATERFOWL:	October	20	20	1	9	50	220-1, 543-49
	November		1			1	652-1
	December	4	1		70	75	653-70, 543-5
	January					0	
	February					0	
	March					0	
Totals........................		24	22	1	79	126	

(Continued)

Table VII (Continued)

Species	Month	Males	Females	Young	Unknown	Total No.	Habitat[1] Types and Number Observed in Each Type
RAPTORS:	October	4	1	5	8	18	111-6, 220-10, 543-2
	November	1			12	13	111-3, 212-4, 220-6
	December				8	8	111-1, 212-6, 220-1
	January				8	8	111-5, 220-3
	February				12	12	111-7, 220-4, 533-1
	March				5	5	111-3, 533-2
Totals......................		5	1	5	53	64	
SAGE GROUSE:	October					0	
	November	1				1	212-1
	December	6				6	212-6
	January					0	
	February					0	
	March					0	
Totals......................		7				7	
PHEASANTS:	October	1				1	220-1
	November	1				1	220-1
	December	1			21	22	220-2, 533-20
	January	1				1	220-1
	February					0	
	March	2				2	220-2
Totals......................		6			21	27	
COYOTES:	October				3	3	111-1, 220-2
	November				2	2	212-2
	December				11	11	111-1, 212-1, 220-3, 231-6
	January				1	1	111-1
	February				5	5	111-5
	March				2	2	111-2
Totals......................					24	24	

(Continued)

Table VII (Continued)

Species	Month	Males	Females	Young	Unknown	Total No.	Habitat Types[1] and Number Observed in Each Type
SHARP-TAILED GROUSE:	October				34	34	220-27, 231-2, 533-5
	November				40	40	212-16, 220-10, 533-14
	December				89	89	212-22, 220-15, 231-25, 533-16, 653-11
	January				39	39	111-15, 220-9, 231-6, 542-9
	February				91	91	212-13, 220-59, 231-11, 542-8
	March				32	32	110-10, 220-17, 231-5
Totals					325	325	
HUNGARIAN PARTRIDGE:	October					0	
	November					0	
	December				65	65	111-11, 212-6, 220-7, 512-4, 533-20, 653-17
	January				36	36	111-11, 120-3, 220-4, 533-8, 653-10
	February				4	4	111-4
	March					0	
Totals					105	105	
RED FOX:	October					0	
	November					0	
	December				2	2	111-1, 212-1
	January				1	1	111-1
	February				3	3	111-2, 220-1
	March					0	
Totals					6	6	

[1] Habitat types are as follows: 111 - Grassland; 211 - Big Sagebrush Grassland; 212 - Silver Sagebrush Grassland; 220 - Creek Bottom; 231 - Coulee Bottom; 353 - Juniper; 533 - Agricultural; 543 - Ponds.

revealed that creeping juniper (*Juniperus horizontalis*) accounted for 53.5% of the 1,186 instances of use recorded. This was followed by silver sagebrush (*Artemisia cana*) with 30%, rubber rabbitbrush (*Chrysothamnus nauseosus*) with 8.8%, little bluestem (*Andropogon scoparius*) with 3.0%, and yucca (*Yucca glauca*) with 2.7% of the instances of use.

A total of 804 mule deer were observed during the reporting period (Table VII). Most of these observations occurred along the Lime-Canyon Creek drainage, although about 16 mule deer were observed to winter along Cherry Creek, and a few wintered along lower Porcupine Creek. Two hundred and twenty-eight white-tailed deer were observed during the period, and primarily along the Lime-Canyon Creek drainage and the Milk River. There was also a group of about 20 whitetails which wintered along the north edge of the study area in open grassland and agricultural habitat and about three miles north of the Porcupine Creek bottom habitat. These whitetails were believed to inhabit the Porcupine Creek bottom during the other seasons. A total of 126 waterfowl were observed on the study area from October through December, but none were observed from January through March 15.

Most of the game bird observations for this period occurred in the creek bottom and associated silver sagebrush-grassland or agricultural habitat types (Table VII). These included 325 sharp-tailed grouse, 105 Hungarian partridge, 27 pheasants, and 7 sage grouse. Sixty-four raptors were observed during the reporting period, and most of these were golden eagles. They were observed mainly along the major drainages, excluding the Milk River, during the winter months. Twenty-four coyotes and six red fox were observed during the period (Table VII), with the coyotes being most abundant in the study area along the Lime-Canyon Creek drainage and upper Porcupine Creek.

B. Hunting Pressure

During the immediate post-hunting season period, landholders were contacted to determine hunting pressures on the GAFB study area. All landholders contacted allowed hunting by permission on their holdings, except for a portion of Cherry Creek on which no hunting was allowed.

1. Big Game:

The hunting of deer, both white-tailed and mule deer, is restricted to the major drainages and associated breaks. The Milk River and Porcupine Creek are inhabited by white-tailed deer, for the most part, while Cherry Creek and the Lime-Canyon Creek drainages have a higher percentage of mule deer. Porcupine Creek and the Milk River support the greatest pressure, due to accessibility, although it appears that success rates are relatively low. The remaining drainages support less pressure by hunters, yet appear to have higher deer populations.

The resident antelope population during the fall hunting season is relatively low. A majority of the local hunters pursue this species on nearby areas not included in the study area.

Due mainly to readily available and nearby areas with larger big game populations, the study area deer and antelope populations are generally subjected to low hunting pressure.

2. Game Birds:

The hunting pressure exerted on the gallinaceous game birds, which include sage grouse, sharp-tailed grouse, ring-necked pheasants, and Hungarian partridge, is limited to relatively small portions of the study area due to the restricted distributions of these species. Sage grouse are quite rare on the area and are taken primarily as a bonus to sharp-tailed grouse hunting.

Sharp-tailed grouse hunting is primarily concentrated in the drainages and larger coulees containing brushy cover. Success has been reported as being good in certain areas including the Cherry Creek and Lime-Canyon Creek drainages.

Pheasants are restricted to the major drainages of the study area and seem to be concentrated near areas where cattle are fed or near grain stubble fields. Hunting pressure is fairly heavy on pheasants along the Milk River, with success reportedly being moderate.

Hungarian partridge populations are relatively low throughout the study area, with most being taken as a bonus while primarily hunting the other game bird species. Pressure on this species as a primary target is negligible.

3. Waterfowl:

Waterfowl hunting on the GAFB study area is reportedly very good. The pressure by hunters on waterfowl is restricted to the major drainage systems and their associated grain fields, and to the many reservoirs occurring throughout the area.

4. Furbearers:

Coyote, red fox, badger, and raccoon are the major species pursued by fur hunters and trappers on the study area. Pressure on coyotes and fox is very heavy by both hunters and trappers. Trapping during the winter of 1978 was restricted by the heavy snow accumulations, while hunting with aircraft was enhanced by the associated improvement in visibility of these species.

Badgers are common on the study area and are highly sought by trappers. Early winter conditions again reduced the pressure by trappers, while early trapping was reportedly excellent.

Raccoons are trapped and night-hunted on the Milk River and Porcupine Creek quite heavily. Populations are reportedly increasing, and success was very good during the fall of 1977. Hunting of raccoons with dogs is becoming increasingly popular in the area, and the pressure on this species is similarly increasing.

The remaining furbearers, such as mink, muskrat, ermine and beaver are available but are pursued on a less intensive basis. Beaver are available on Porcupine Creek, but there was no evidence of them being trapped during the winter of 1978. Muskrat and mink are trapped on the major drainages, with success being relatively low.

In conclusion, big game and waterfowl hunting pressure is restricted and relatively low. The pressure on game birds is also restricted but is of a moderate degree. The hunting and trapping pressure on the major furbearers is heavy due to an increased amount of aerial hunting and relatively high fur prices.

C. Minor Wildlife Species

Several small mammal traplines were run during the fall and winter seasons, and again the western deer mouse (*Peromyscus maniculatus*) was the only species captured. Two traplines were run during October at Sites 6 and 7, which involved Sherman live traps and snap traps, respectively. Three snap trap traplines were run during the winter months (Feb.-Mar.) at Sites 8, 9, and 10. The results from these traplines are presented in Table VII. Additional trapping was attempted during the fall and winter months but was uncompleted due to adverse weather and travel conditions. As is noted from the results in Table VIII, the small mammal populations remain very low at the sites where trapping was completed.

TABLE VIII

WESTERN DEER MICE CAPTURED AT FIVE TRAPPING SITES DURING FALL AND WINTER ON THE GLASGOW AIR FORCE BASE STUDY AREA

Site No.	Location	Trap Nights	Sex		Age Class			Total	Habitat Type	Avg. Catch Per Trap Night
			M	F	Juv.	Sub-Ad.	Adult			
Fall:										
6	K.6, 11.5	90	1	1			2	2	Silver Sage-Grassland	.02
7	K.4, 11.5	147	2				2	2	Grassland	.01
Winter:										
8	S.0, 15.5	120	3	2			5	5	Creek Bottom	.04
9	R.3, 15.9	189		1			1	1	Grassland	.01
10	S.6, 17.3	120						0	Silver Sage-Grassland	.00

Only a few additional species of nongame and raptor species were observed on the study area during the fall and winter seasons. These additional species were the: brown-headed cowbird, slate-colored junco, crow, snowy bunting, cedar waxwing, pine grosbeak, hairy woodpecker, snowy owl, and gyrfalcon (not a confirmed identification). Horned larks and snow buntings were the only species observed in most of the habitat types during the winter season; however, the creek bottom and shelter belt habitat types did contain a few additional species. These additional species included the black-capped chickadee, magpie, cedar waxwing, and pine grosbeak, but not in any great numbers.

IV. VEGETATION STUDIES

All work performed for the vegetation studies since the previous progress report has been in developing the habitat map of the 600-square-mile study area. This has involved the photo-interpretation of the infrared photography and delineating the various habitat types and features on overlays. The overlays were then projected onto the base map and a preliminary habitat map was drafted. The 1:24,000 scale preliminary habitat map was drafted in two parts due to its large size. A copy of these preliminary maps (one of the west half and one of the east half of the 600-square-mile study area) will be presented with copies of this progress report. Ground truthing of these maps will commence during April 1978. Upon completion of the ground truthing, the final copy of the habitat map will be drafted, as will the community type map of the 200-square-mile study area. The vegetation field work will commence during May 1978.